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Potential production and trade impacts of abolishing animal health and welfare regulations in the UK¹

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Abstract

This short report documents the results from modelling the production and trade impacts of a hypothetical scenario of abolishment of existing EU animal health and welfare regulations by the UK following BREXIT, using cost estimates compiled by DEFRA (2015). The model implementation of this scenario captures the production impacts of the hypothetical deregulation and the implied trade effects; however, effects of changing trade costs due to the divergence between EU and UK regulations are not considered. The simulation results suggest modest increases in production in the UK and slightly decreased imports from EU member states to the UK, mirroring the relative modest cost saving from the deregulation according to the DEFRA estimates. Bilateral exports from Denmark to the UK of heavily traded animal products (i.e. pork & poultry, dairy, and bovine meats) are expected to decrease but only marginally (between 1.5-3 percent) from the baseline levels. Furthermore, redirection of trade flows to other partners would also enable Denmark to partially offset such negative effects, resulting in very small losses of total Danish exports of these products. These results are qualified with a set of caveats mainly related to the reliabilities and scope of the cost estimates used.

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Introduction

With its withdrawal from the EU, the UK's regulations in the agricultural and food sectors are likely to deviate from existing EU regulations. Such changes may influence production costs of UK farmers and food processors and in turn affect the competitiveness of Danish exports to the UK market.² Denmark has significant food exports to the UK market. In 2016, the Danish food cluster exported a total of DKK 12.3 billion to the UK market, including exports of pork amounting to DKK 3.5 billion and dairy exports of DKK 1.9 billion.

An analysis by the UK's Department for Environment, Food and Rural Affairs ("DEFRA" hereafter) provides some estimates on the monetized costs of health and animal welfare related regulations on the relevant sectors in the UK. The analysis (DEFRA 2015) finds that these regulations (numbered 94 in total, of which 56 are EU regulations) impose the direct cost of US\$577 million to the UK businesses while providing direct benefits of USD 13 million on an annualized basis, implying a net cost to UK businesses of USD 564 million per annum.

Based on the DEFRA estimates, this report presents an analysis of the economic importance for Denmark of changing agricultural and food regulations in the UK, particularly for the dairy and pork sectors. More specifically, this report quantifies the effects of changing animal welfare and health regulations by the UK following its exit from the EU, including the production effects in the UK and the implied effects on Danish exports of pork and dairy products.

This analysis makes direct use of the cost estimates provided in DEFRA's regulation assessment to build a counterfactual scenario in a CGE model to simulate the impacts of the removal of EU animal and health regulations. The removal of these regulations will be modelled as an effective increase in output subsidies (or reductions of output taxes) by the UK government to the relevant sectors. Such actions will result in lowered costs to the UK producers in the model. By directly using the DEFRA cost estimates, it is to be understood that the reliability of the obtained results from this project depends critically on the quality of the DEFRA estimates.

Cost estimates from DEFRA's regulation assessment

DEFRA conducts the so-called "regulatory stock assessment" to estimate the costs and benefits of the stock of DEFRA's regulations. The main components of the report are direct costs and benefits to business, direct costs to other parties, other direct benefits, benefit-cost ratios, un-monetized impacts, apportionment of costs by business sector and by EU (international)/domestic regulations. The most relevant components for the current study are the direct costs and benefits to businesses. According to DEFRA (2015, page 6), direct costs to business includes both "*the policy costs*",

² It should be noted that Danish pork industry has significant investment in the UK. Possible deregulations by the UK may also influence the costs of Danish businesses. Due to the limited scope of current report, such consideration is not included here.

referring to "the substantive costs of achieving the regulations' results, for example investing in pollution control equipment", and "the administrative burden", to be understood as "the cost to business associated with information obligations such as filling in forms and keeping records". Direct benefits to business, on the other hand, include "the benefits resulting directly from action the regulations require accruing either to those taking the action or any others", such as "financial savings (for example from more efficient use of energy) or increased economic activity (for example from more rational use of marine resources)". The net impact on business is therefore the difference between these direct costs and benefits.

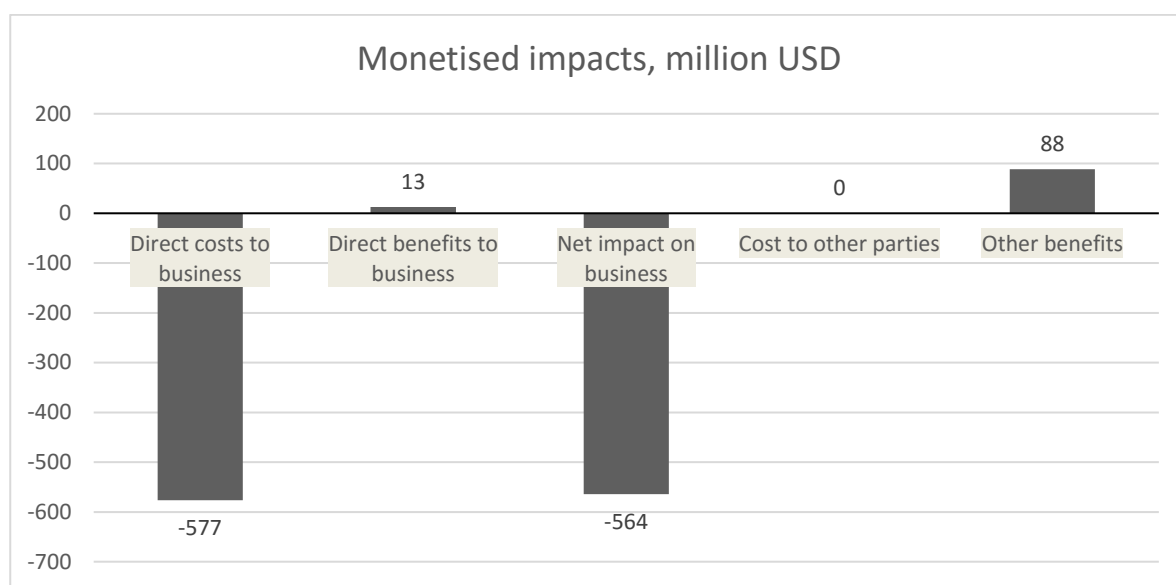


Figure 1. Monetised impacts of animal health and welfare regulations, million USD

Source: Department for Environment, Food & Rural Affairs (DEFRA 2015)

DEFRA's estimates on the direct costs and benefits to business of animal health and welfare regulations (DEFRA 2015, page 21) are respectively 577 and 13 million US dollars (as shown in Figure 1; reproduced from Table 7 in DEFRA (2015) using annualized exchange rate). While the share of estimated costs associated with the EU regulations is listed at 91 percent, the assessment does not provide a breakdown of the benefit estimate. Therefore, it is not possible to derive the net costs to business imposed on the EU regulation alone. Costs to other parties are normally those to regulators and other public agencies, which in the case of animal health and welfare regulations is listed as zero. The item "other benefits" include the direct benefits other than those accruing to business and civil society, such as financial benefits that accrue to households and contributions to a better environment, improved health and well-being. For the animal health and welfare regulations, these benefits are estimated to 88 million US dollars.³

³ It is not clear from the DEFRA report whether this amount captures all such benefits for all the animal health and welfare regulations.

For the purpose of the current analysis, we focus on the direct costs and benefits to businesses – in this case, the relevant sectors that are presumably impacted by the animal health and welfare regulations. Furthermore, we assume that when these regulations are repealed following BREXIT, the net direct costs (i.e. direct costs minus direct benefits) would be avoided, thereby lessening the burden placed on UK producers in the relevant sectors. As the DEFRA estimates do not provide the possibility to distinguish between direct costs and benefits associated with EU and UK regulations, in the modelling exercise underlying this report we assume all 94 regulations will be abolished. While such an assumption is less than ideal, the quantitative results should not be affected much, as the EU regulations contribute to 91 percent of the total estimated direct costs. In the case of the estimated direct benefits, they are only a fraction of the direct costs to businesses and it would be reasonable to assume that the benefits due to EU regulations are also small. Therefore, it can be reasonably assumed that the estimated effects to be presented below are mainly due to the abolishment of the EU regulations. With the focus of the DEFRA estimates being on costs and benefits to domestic businesses, another important consideration that is not included in the current study is the potentially rising trade costs on animal products traded between the EU and the UK. These costs are associated with the divergence between EU and UK regulations following the assumed abolishment of EU regulations in the UK. This dimension of BREXIT is analysed in the existing literature (see e.g. Yu et al. 2017 and references contained therein).

It should be noted that DEFRA assigned a "reliability rating" on the estimates of 2.4 on the scale of 5, with a rating of 5 representing the situation that the "costs are very well understood and all or almost all estimates are evidenced by real-world data". Therefore, it appears that the estimates to be used in the current study have relatively low reliability, signalling that these cost estimates are either *"not fully understood or rely largely on expert judgement informed by some real-world data"* (DEFRA 2015, page 2). As such, the modelling results obtained in this study based on the DEFRA cost estimates should be taken with caution, although the results do provide an indication of the potential effects of the UK abolishing agriculture and food standards.

Methodology

As the main purpose of the report is to assess the potential impacts on Danish agrifood exports of a hypothetical abolishment of animal health and welfare regulations by the UK, a trade model with international trade linkages at sectoral level would be most desirable. Furthermore, as the regulations in question do not directly target international trade flows but impose costs on production, the production structure of the related sectors must be explicitly represented in the model to be used. This points to the application of multi-sector, multi-country computable general equilibrium model (CGE). We therefore choose the well-known GTAP model (Hertel & Tsigas 1997) and database for this analysis. The GTAP model is a standard global CGE model, widely applied in the analysis of international impacts of trade and domestic policy changes, as its explicit

and consistent representation of the production system, demand structure, and international trade linkages, and simultaneous clearing of all markets allow for capturing the general equilibrium effects of policy changes at sectoral, national and global scales. Using the potential abolishment of animal health and welfare regulations in the UK as an example, in the model the deregulation will first influence the supply of the animal product sectors in the UK, allowing these sectors to expand. With equilibrium conditions to be observed in the model to clear simultaneously the domestic and world markets, increased domestic supply in the UK will reduce the gap between domestic demand and supply for animal products and lower domestic market prices in the UK. This in turn reduces the UK's import demand for animal products, as the domestic supply partially substitutes for imported products. For an exporting country such as Denmark, the reduced import demand from the UK will generally prompt Denmark to partially redirect its exports elsewhere as well as to increase domestic consumption, as domestic prices in Denmark decrease. However, in general such adjustments will not make up for all the lost exports to the UK market, thereby leading to reductions in total production in Denmark.

More specifically, this analysis builds on the work of Yu et al. (2017) on estimating the impacts of BREXIT on Danish agriculture. To isolate the effects of the possible abolishment of animal health and welfare regulations by the UK from those effects due to changing trade arrangements between the UK and the EU (as well as those arising from likely changing trade relationship between the UK and the EU's preferential trade partners), the scenario to be simulated will be based on the same baseline case of 2021 as constructed in Yu et al. (2017) to represent the non-BREXIT scenario in that year, assuming that BREXIT moves forward in 2019 and completes in 2021.

The animal health and welfare regulations impacts several sectors represented in the aggregated GTAP database and baseline used in Yu et al. (2017), including: bovine animal, bovine meats, pork & poultry, raw milk, and dairy. Details on the classifications of these sectors can be found in Appendix Table 2a in Yu et al. (2017). It is worth noting that these five sectors have very different trade intensities, with bovine animal and raw milk not being traded very much whereas bovine meats, pork & poultry, and dairy being traded intensively. As mentioned earlier, Denmark is a major exporter of pork meats and dairy products, with the UK as a major export destination. Therefore, the focus of the study is to numerically simulate the impact of the deregulation by the UK on the production pattern in these products and to assess the entailed impacts on Danish exports.

The DEFRA report provides no details on the distributions of costs across the above mentioned sectors; nor does it distinguish the costs arising from EU regulations and those due to national regulations. In constructing the scenario to be simulated, it is therefore assumed that the UK would abolish all animal health and welfare regulations, thereby providing a cost saving in the amount of USD 564 million to the producers in the five sectors included in this analysis. Furthermore, without knowing how the cost savings would be allocated across sectors from the DEFRA report, these cost

savings will be represented in the model as an equal-proportional increase in the subsidy rate (or a reduction of tax rate, depending on the initial situation in the baseline data set) attached to the outputs of the five sectors that are already represented in the database. This ensures that the distribution of the subsidies are reasonably associated with the production values of these products. In essence, an increase of 1.06 percent to the power of subsidy rate (i.e. $1 + \text{subsidy ratio}$) is obtained from the model simulation, in order for the five sectors to realize a total cost saving of USD 564 million. This rather small increase in the output subsidy rate explains the relative small impact of the envisioned deregulation to be presented in the next section, as the cost saving is a small fraction of the total production value of animal products in the UK.

Results

The assumed deregulations by the UK either reduce the extra burdens on production of the meats and dairy products as these products are initially taxed in the baseline, or increase the incentive on the production of bovine animals and raw milk as the initial output subsidies on these products are increased.⁴ In both cases, increased outputs are expected in the UK for all the five sectors.

Simulation results suggest that outputs of bovine meats, pork & poultry, and dairy products rise by 2.9, 3.2 and 3.1 percent, respectively, as can be seen in Table 1. The size of these simulated output changes corresponds well to that of the shocks adopted, as noted earlier. Accompanying these output expansions in the UK is the general reductions of outputs of animal products in the EU27. For example, Ireland is negatively affected in its bovine animal and meats sectors, as well as in the dairy sectors. Denmark is also expected to be negatively affected; however, the overall production impact for Denmark appears to be quite small at between one-tenth and two-tenth of a percentage point reduction, relative to the baseline case.

These negative production effects on Denmark's animal agricultural sectors can be explained by changing trade linkages due to UK's deregulation. As domestic production in the UK rises and domestic market prices drop, excess demand for these products in the UK shrink, leading to lowered import demand for products sourced from its trading partners, particularly those within the EU. Indeed, Table 2 reports across-the-board reductions in exports from all the individual EU member states included in the analysis as well as from the aggregated Rest of EU region for the three traded animal product categories (i.e. bovine meats, pork & poultry, and dairy products). The reduction against the baseline are measured at about 3 percent for bovine meats, 1.6 percent for pork & poultry, and about 3 percent for dairy products. For bovine animal and raw milk, there are some slight increases in percentage terms; however, it should be pointed out that these two products are essentially non-traded and such percentage changes represent very little change in trade volumes in monetary terms (as can be seen in Table 2). The rather small production effects reported for Denmark (and other EU member states; see Table 1) – as compared to the reported percentage

⁴ In the standard GTAP model and database, the payments from the common agricultural policy of the EU are mainly allocated to the primary production factors such as land.

Table 1. *Impacts on sectoral outputs, percent from baseline*

	Bovine animal	Bovine meats	Pork & poultry	Raw milk	Dairy
Denmark	-0.10	-0.13	-0.07	-0.18	-0.22
France	-0.07	-0.12	-0.06	-0.14	-0.18
Germany	-0.10	-0.17	-0.12	-0.09	-0.11
Ireland	-0.32	-1.17	-0.41	-0.42	-0.52
Italy	-0.05	-0.07	-0.03	-0.11	-0.14
Netherlands	-0.22	-0.36	-0.38	-0.11	-0.12
Poland	-0.07	-0.08	-0.05	-0.03	-0.03
Spain	-0.07	-0.09	-0.06	-0.06	-0.07
Rest of EU27	-0.05	-0.08	-0.04	-0.07	-0.10
UK	2.10	2.90	3.19	2.36	3.07

Source: simulation results

changes of outputs in the UK – can be mainly explained by two mechanisms. First, imports of animal products from Denmark to the UK are only a fraction of total Danish exports of animal products; therefore, everything else being unchanged, the direct effect of reductions of UK import demand on Danish outputs will be understandably much smaller. Second, as the UK's import demand shrinks, prices of Danish animal products will be dampened so as to stimulate both domestic production and exports to elsewhere. This further limits the reduction of total Danish exports and domestic production.

Similar to the overall changing trade patterns, Denmark's exports to the UK of the three tradeable products are expected to drop by between 1.5-3 percent. However, owing to the possibility to redirect trade to other markets, the total reductions to Danish exports are much smaller in both percentage terms and in value terms – in the case of pork & poultry and dairy products, total Danish exports would be about USD 7.4 and 14 million lower than the corresponding baseline levels. These results are qualitatively similar to the findings in Yu et al. (2017) where much more moderate total exports effects are found for Denmark due to BREXIT.

Table 2. *Simulated impacts on trade flows, measured against the baseline*

	Bovine animal	Bovine meats	Pork & poultry	Raw milk	Dairy
Changes in UK imports by sources, percent from baseline					
Denmark	1.028	-3.025	-1.519	1.624	-3.104
France	0.99	-3.04	-1.599	1.396	-3.187
Germany	0.998	-3.05	-1.579	1.432	-3.17
Ireland	1.208	-2.719	-1.361	2.046	-2.156
Italy	0.978	-3.061	-1.619	1.352	-3.212
Netherlands	1.059	-2.991	-1.566	1.489	-3.112
Poland	1.021	-3.037	-1.535	1.441	-3.215
Spain	0.975	-3.069	-1.631	1.294	-3.225
Rest of EU	0.991	-3.059	-1.611	1.387	-3.198
Changes in total imports into the UK					
Total imports into UK, percent change	1.134	-2.918	-1.511	1.329	-2.944
Total imports into UK, change in million USD, baseline prices	5.398	-98.453	-145.923	0.342	-130.256
Changes in total exports from Denmark					
Total exports from Denmark, percent change	-0.006	-0.135	-0.074	0.294	-0.443
Total exports from Denmark, change in million USD, baseline prices	-0.005	-1.224	-7.366	0.002	-13.966

Source: simulation results

Conclusion and discussion

This short report documents the results from modelling the impacts of possible abolishment of animal health and welfare regulations by the UK following BREXIT. The focus is on how such changes may lessen the burdens on the UK producers in sectors such as bovine animals, bovine meats, pork & poultry, raw milk, and dairy, thereby incentivizing domestic production in the UK. This would also increase the UK producers' competitiveness over its traditional trading partners in the EU27 and can potentially reduce imports from these partners.

Data sources regarding the direct costs on the producers arising from these regulations are scarce, with the only study identified here being the cost assessment provided by DEFRA (2015). Built on the DEFRA estimates, this study constructs a scenario in which the UK totally abolishes all animal

health and welfare regulations, which in the model is implemented as an equal-proportionate rise in effective subsidy rates in the five animal agriculture sectors represented in the model, with the resulting total subsidy spending matching the total cost saving estimated by DEFRA. While the simulation results obtained against a baseline of 2021 point to effects of the expected directions, with the UK production rising and its imports from EU member states declining, such effects are nonetheless quite small, mirroring the relative modest cost saving from the deregulation according to the DEFRA study.

Bilateral exports from Denmark to the UK in heavily traded animal agricultural products (i.e. pork & poultry, dairy, and bovine meats) are expected to decrease but only marginally (between 1.5-3 percent) from the baseline levels. Furthermore, redirection of trade flows to other partners would also enable Denmark to partially offset such negative effects, resulting in very small losses of total exports in these sectors.

In summary, it appears that potential deregulations in the animal health and welfare areas by the UK following BREXIT do not appear to be a major concern by itself for Danish export interests. However, the expected negative impacts would marginally compound the likely more dramatic impacts of rising trade costs associated with BREXIT, particularly in a "hard" BREXIT scenario.

Several caveats should be noted. First, the results presented here should only be treated as indicative, particularly due to the lack of more reliable and detailed estimates on the actual direct costs imposed on UK producers by the animal health and welfare regulations. Second, the scenario presented here assumes abolishment of all animal welfare and health regulations imposed by both the EU and the UK, because the data source underlying this report does not attribute both direct costs and benefits to businesses to these two types of regulations. Ideally, such a scenario should only include the abolishment of the EU regulations but not the UK regulations in connections with BREXIT. Last, as animal health and welfare regulations are designed to enhance product quality and safety and to prevent animal disease outbreaks, deregulation can conceivably weaken the trust of consumers in the UK and abroad of products produced in the UK, thereby possibly mitigating the negative production and trade effects on the UK's trading partners. This consideration is not included in the current study, due to the lack of complete estimates on the wider societal benefits of these regulations.

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